A: Datasheet

Algorithm: s1_001

Developer: Samsung S1 Corp

Submission Date: 2021_11_01

Template size: 2048 bytes

Template time (2.5 percentile): 813 msec

Template time (median): 814 msec

Template time (97.5 percentile): 818 msec

Investigation:

Frontal mugshot ranking 101 (out of 329) –– FNIR(1600000, 0, 1) = 0.0031 vs. lowest 0.0009 from sensetime_006

Mugshot webcam ranking 79 (out of 291) –– FNIR(1600000, 0, 1) = 0.0139 vs. lowest 0.0057 from sensetime_006

Mugshot profile ranking 49 (out of 260) –– FNIR(1600000, 0, 1) = 0.2154 vs. lowest 0.0550 from sensetime_006

Immigration visa–border ranking 38 (out of 218) –– FNIR(1600000, 0, 1) = 0.0026 vs. lowest 0.0009 from sensetime_006

Immigration visa–kiosk ranking 25 (out of 215) –– FNIR(1600000, 0, 1) = 0.0770 vs. lowest 0.0487 from cubox_000

Identification:

Frontal mugshot ranking 61 (out of 329) –– FNIR(1600000, T, L+1) = 0.0155, FPIR=0.001000 vs. lowest 0.0017 from nec_005

Mugshot webcam ranking 55 (out of 289) –– FNIR(1600000, T, L+1) = 0.0517, FPIR=0.001000 vs. lowest 0.0120 from nec_005

Mugshot profile ranking 97 (out of 259) –– FNIR(1600000, T, L+1) = 0.9852, FPIR=0.001000 vs. lowest 0.1331 from cloudwalk_hr_000

Immigration visa–border ranking 44 (out of 217) –– FNIR(1600000, T, L+1) = 0.0185, FPIR=0.001000 vs. lowest 0.0032 from paravision_009

Immigration visa–kiosk ranking 26 (out of 212) –– FNIR(1600000, T, L+1) = 0.1485, FPIR=0.001000 vs. lowest 0.0728 from paravision_009

B: Mugshot natural images, identification mode: FNIR(N, L+1, T) vs. most accurate (nec_005)
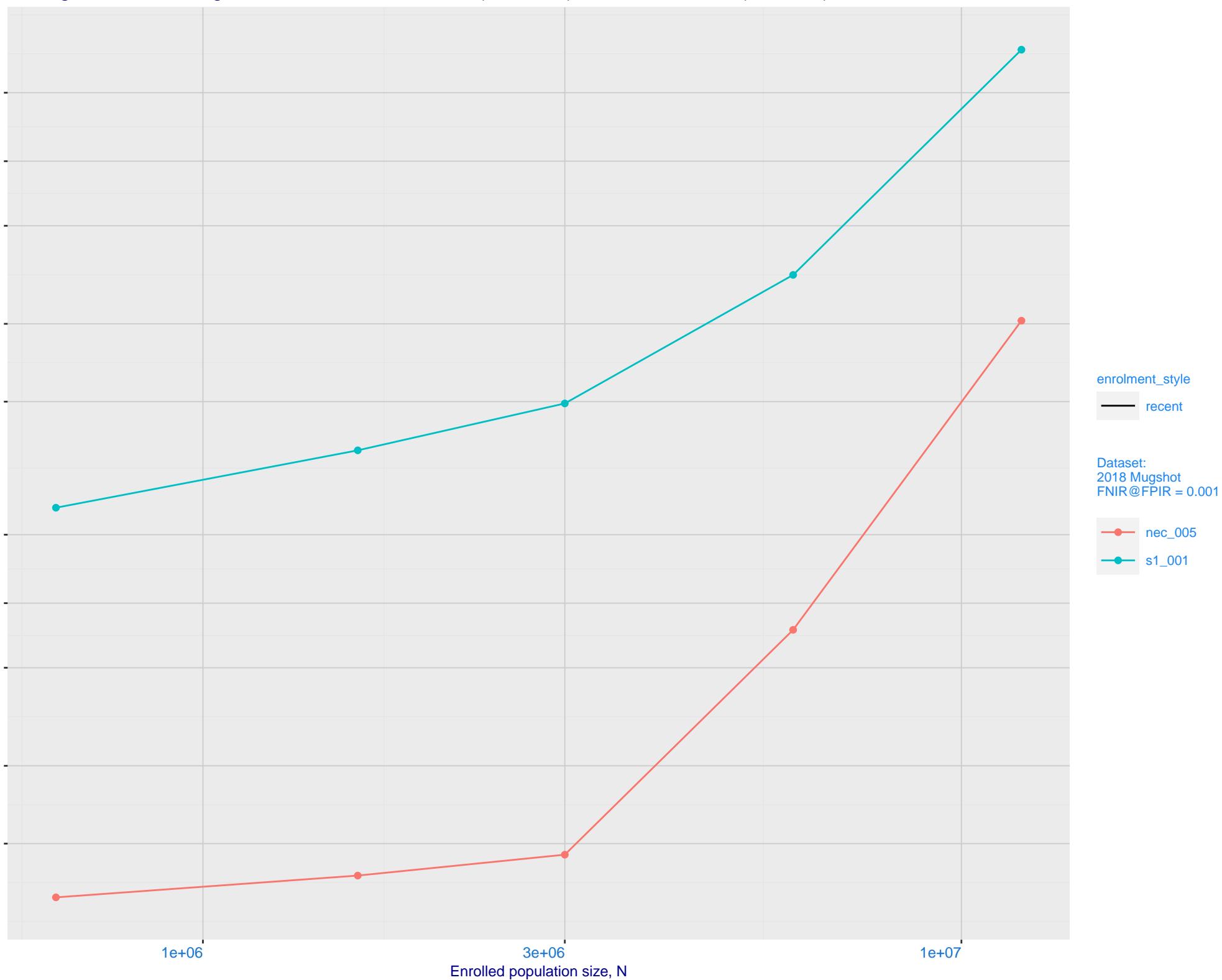
C: Evolution of accuracy for S1 algorithms on three datasets 2018 – present

False negative identification rate (FNIR) at false match rate (FPIR) = 0.010000

Date algorithm submitted to FRVT

Dataset
- Mugshot–Mugshot
- Mugshot–ProfileView
- Mugshot–Webcam
- Visa–Border
- Visa–Kiosk
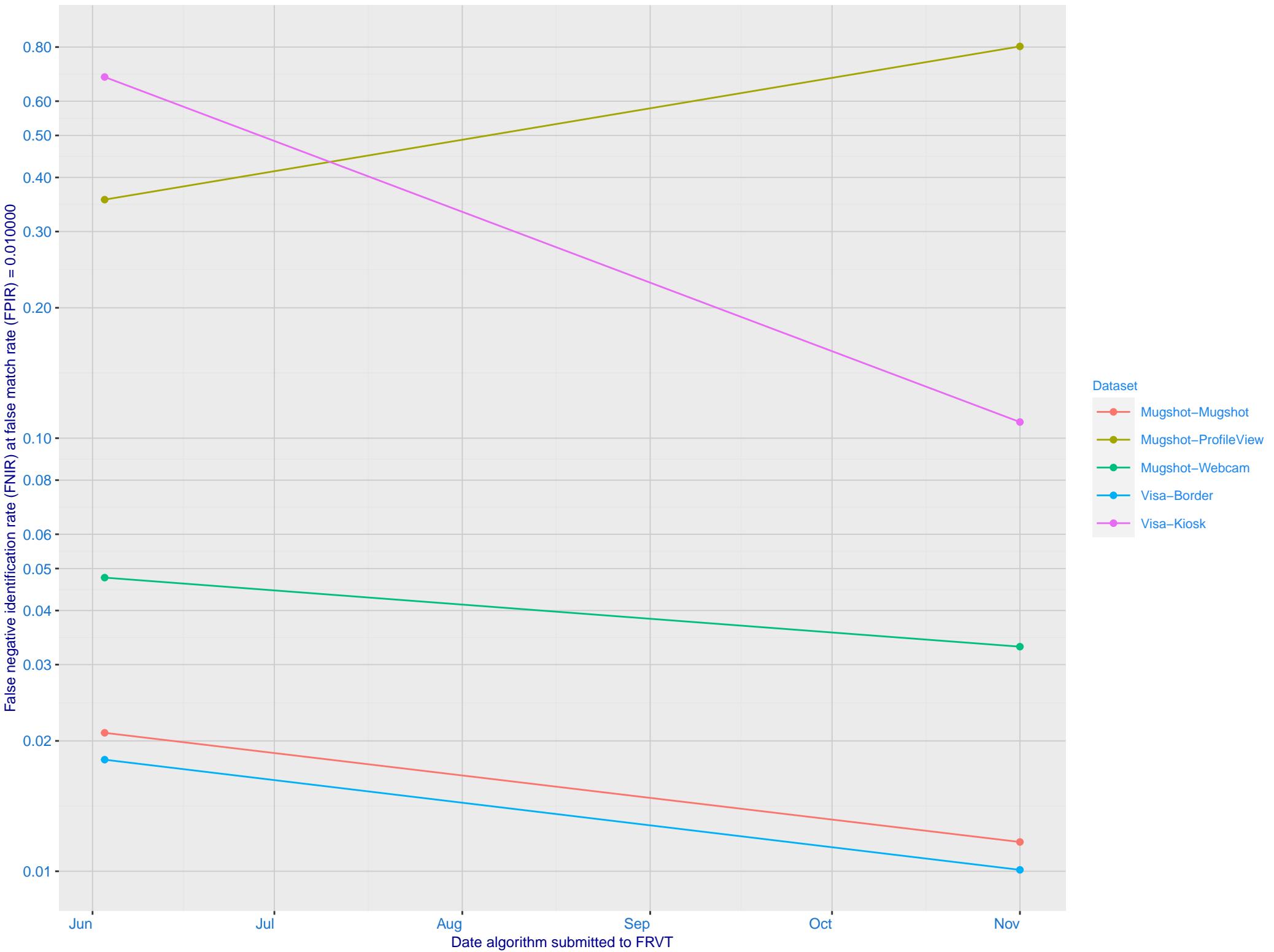
D: 1:N error tradeoff by dataset and enrollment type. N = 1600000 individuals
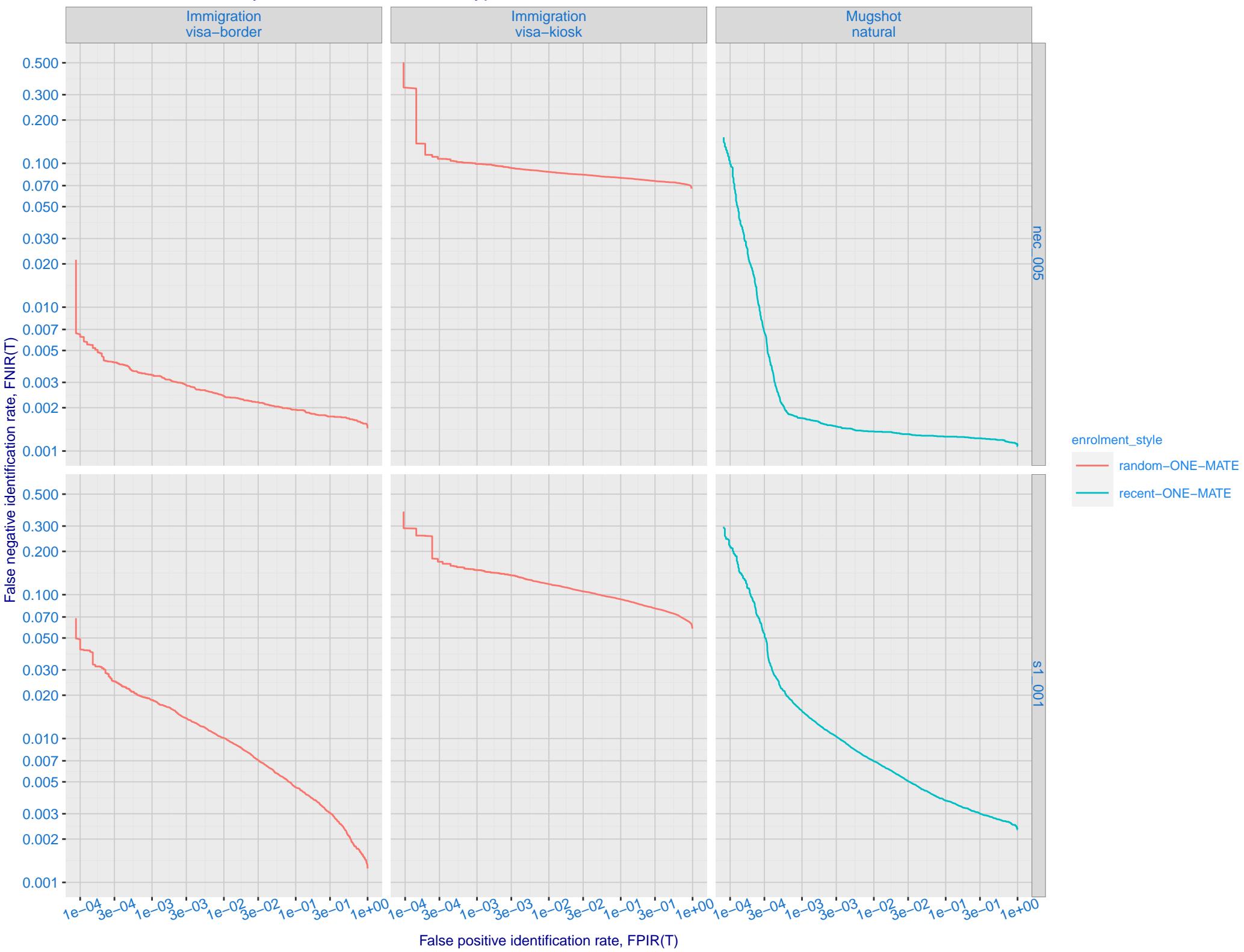
E: Dependence of error rates on T by number enrolled identities, N, for Mugshot natural images
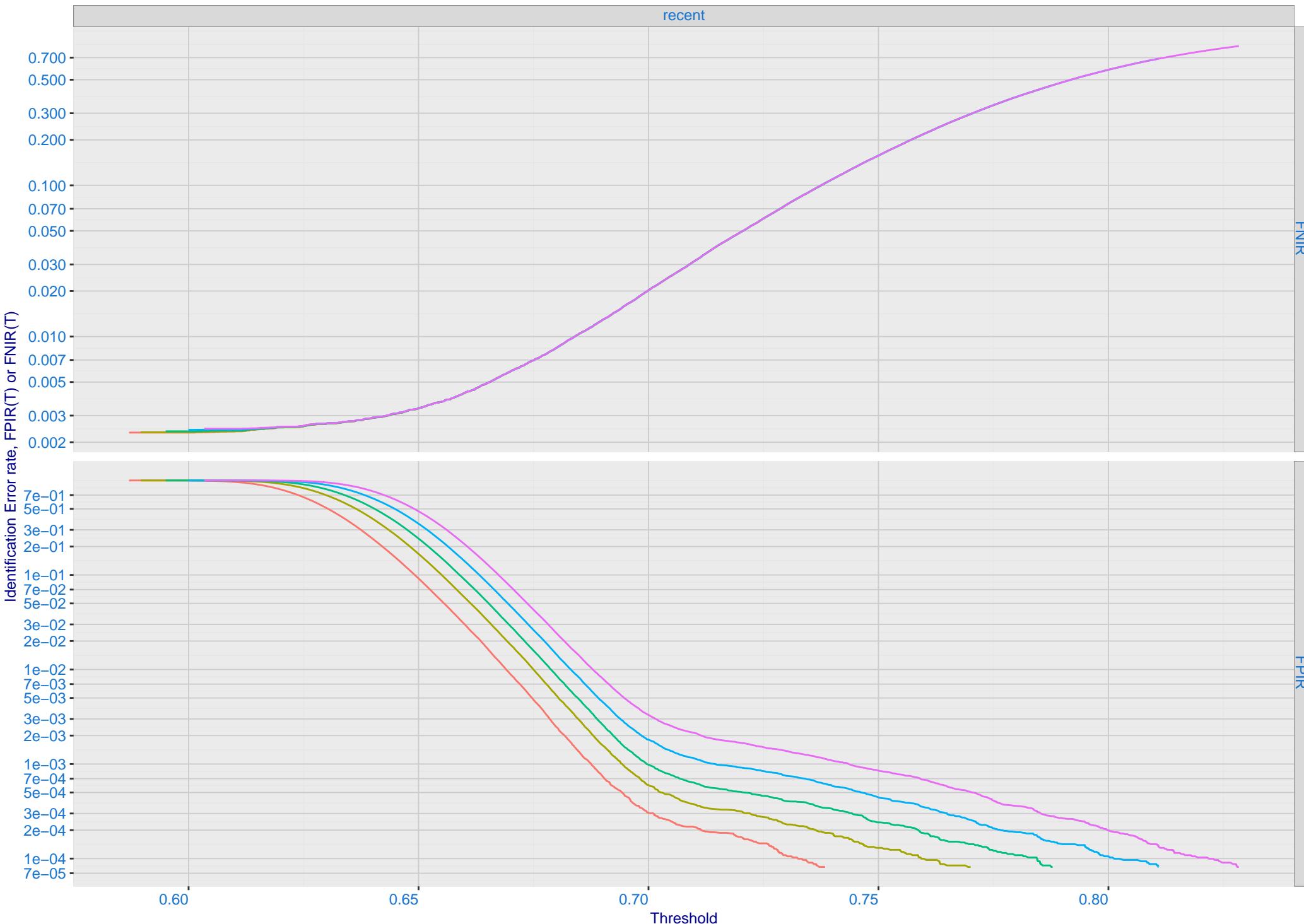
F: FPIR vs. Selectivity for mugshot images, N = 1600000 subjects enrolled with one recent mate
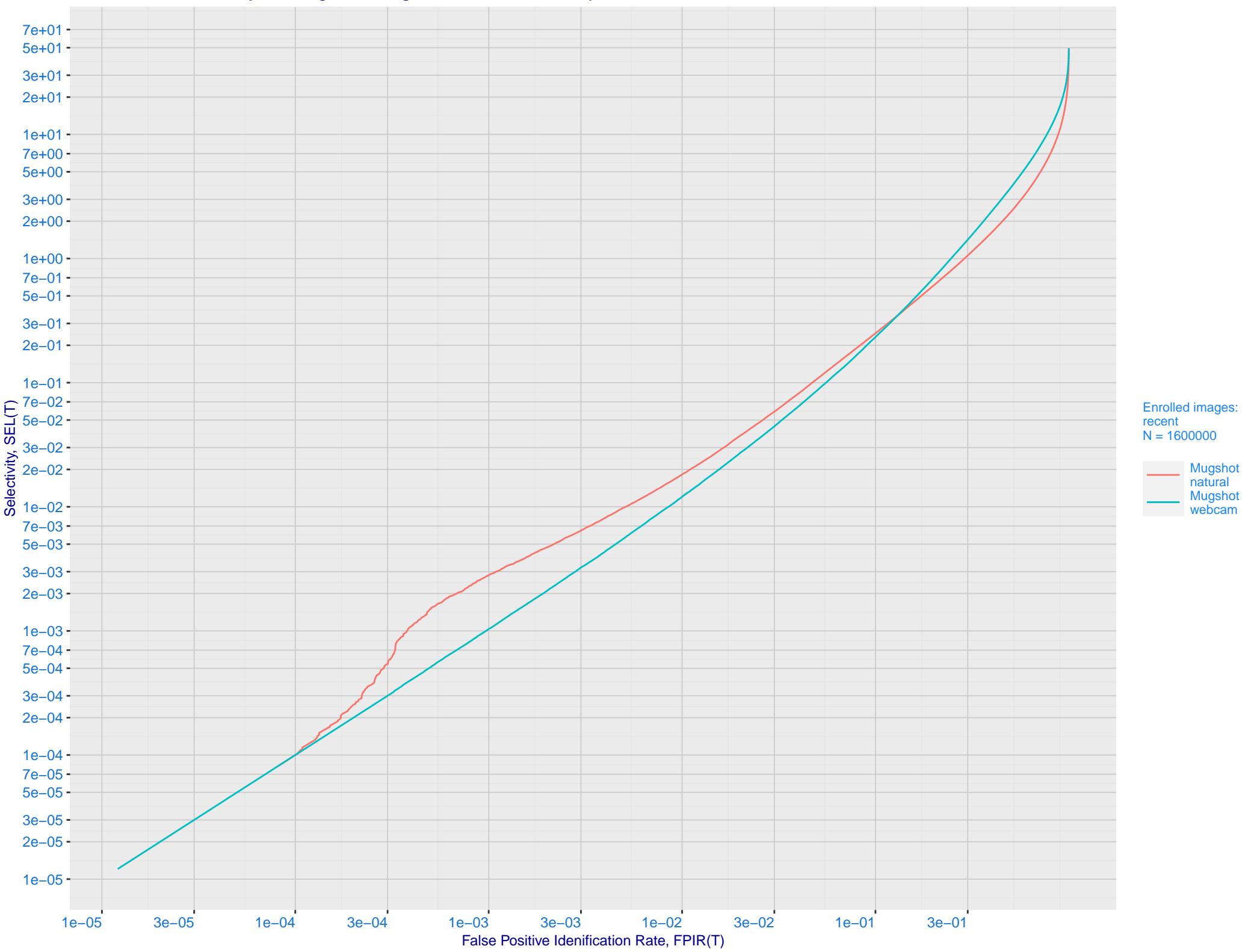
G: FPIR dependence on T by probe type for N = 1600000 subjects
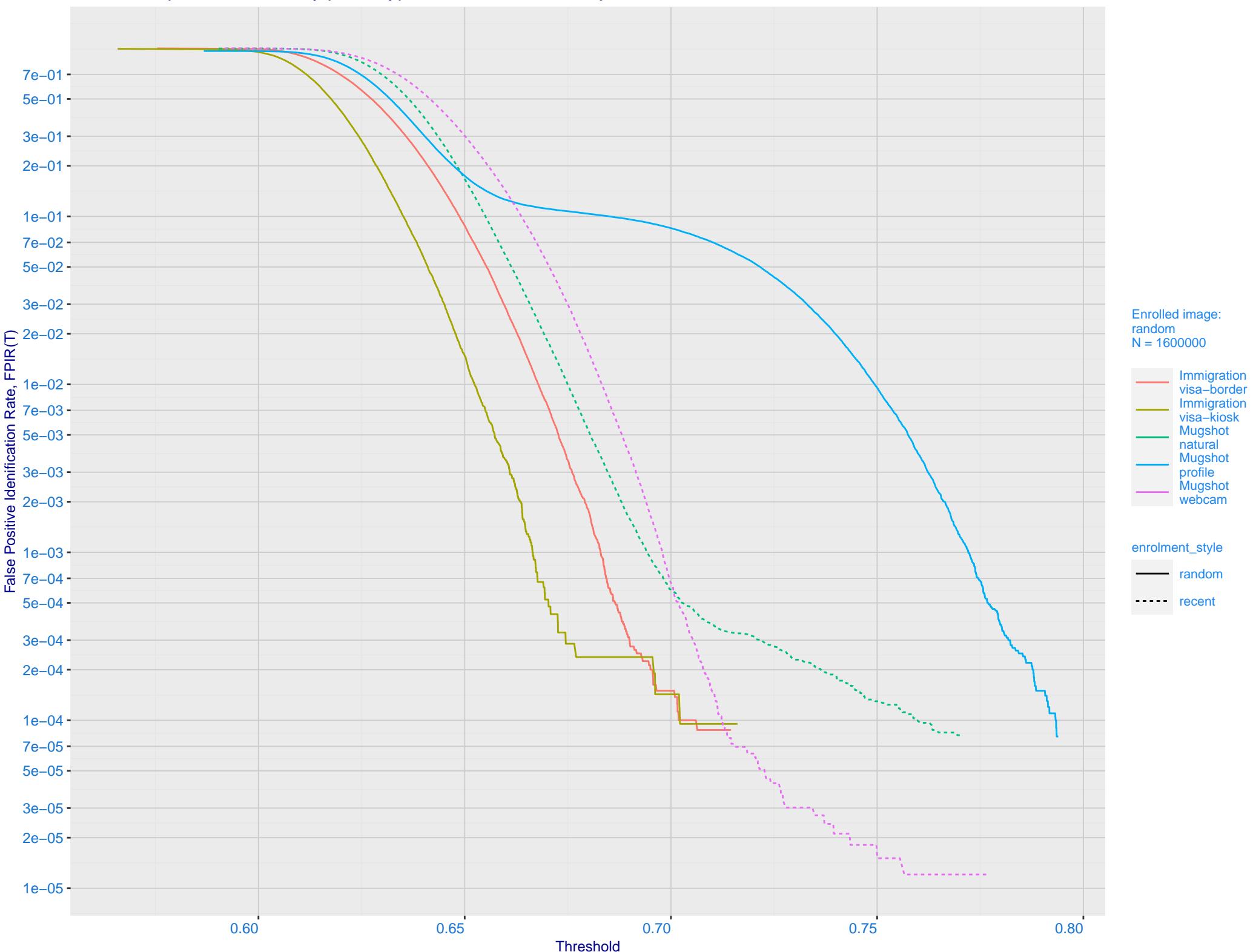
H: Reduced length candidate lists for human review
Dataset is border−border with time−lapse [10,15] YRS with N = 1600000. Probes are 10−15 years later than enrollment image

Mated

without threshold, all lists have same length, here 50

with low threshold, list length shortens towards 1 as there is 1 mate

at high threshold, lists gradually get shorter as mates fall below threshold (misses)

the pink region shows [5,95]−percentile of list lengths

Non−Mated

without threshold, all lists have same length, here 50

with low threshold, list length shortens

at high threshold, lists only rarely have any candidates here only 1 in 100

Mean candidate list length

Threshold value

I: FNIR and FPIR dependence on threshold
Dataset is border–border with time–lapse [10,15] YRS with N = 1600000. Probes are 10–15 years later than enrollment image
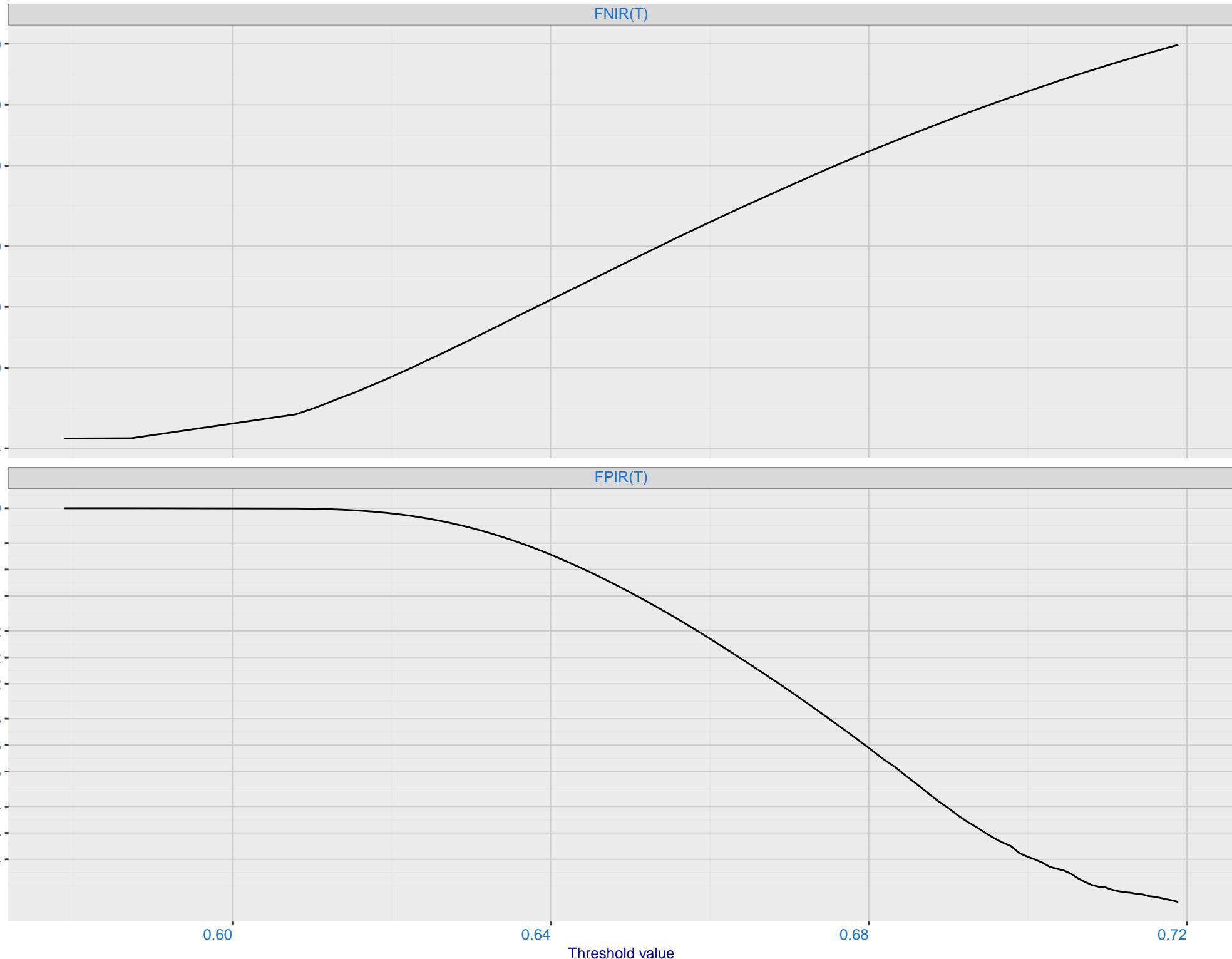
J: DET for Mugshot natural images and various N. Links connect points of equal threshold.
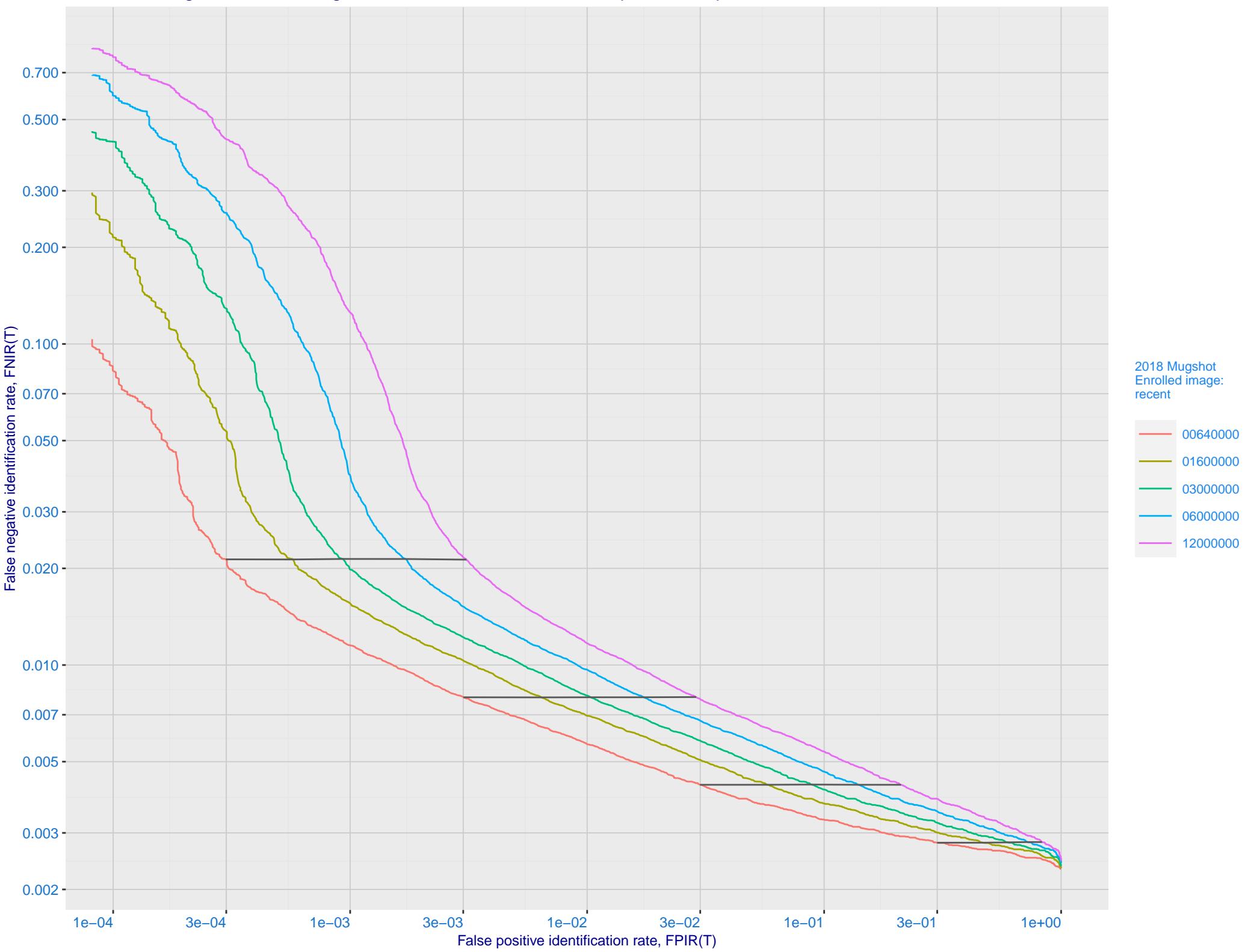
K: Investigational mode: FNIR(N, 1, 0) vs. most accurate (sensetime_006)
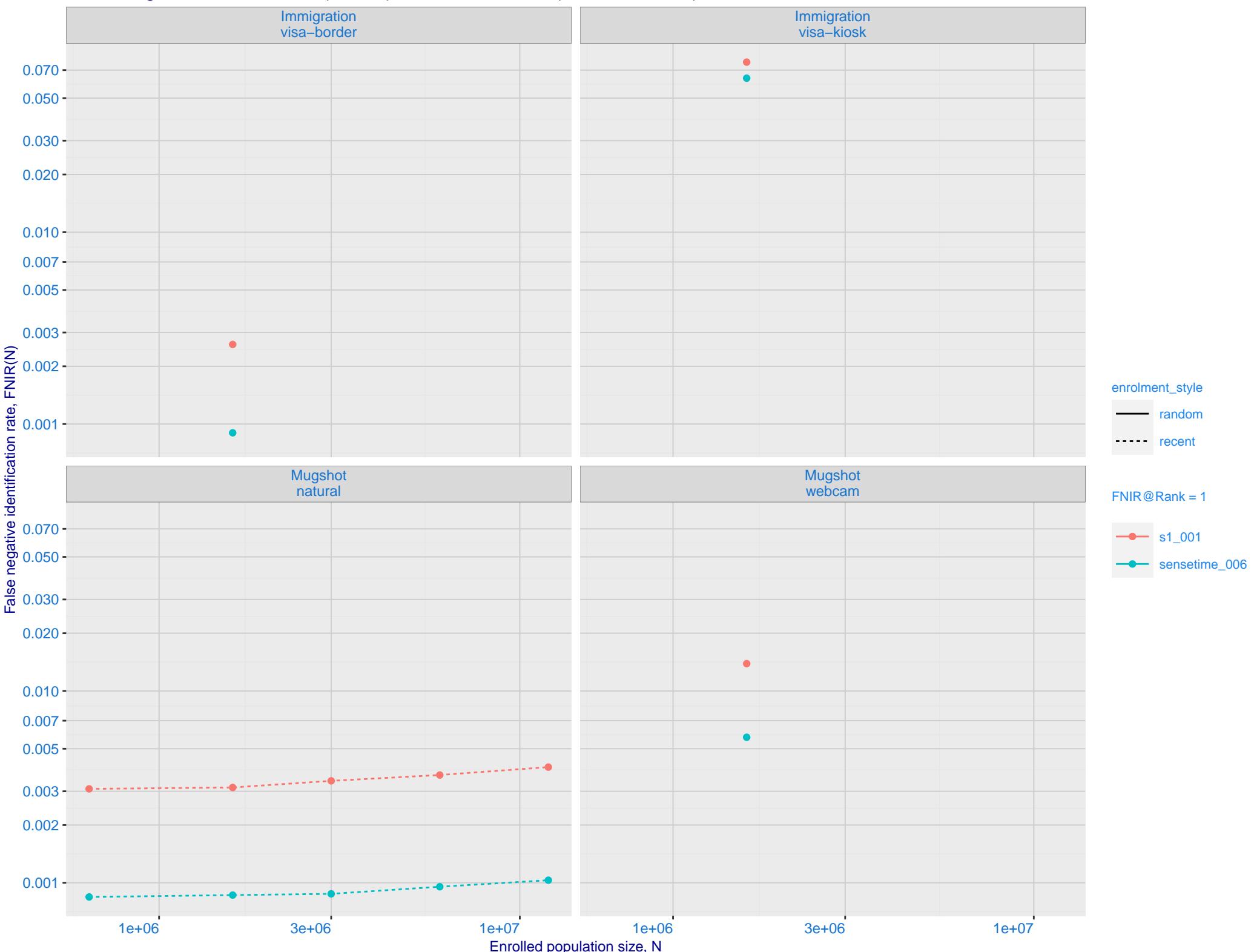
L: Investigational mode: FNIR(1600000, R, 0) by probe type
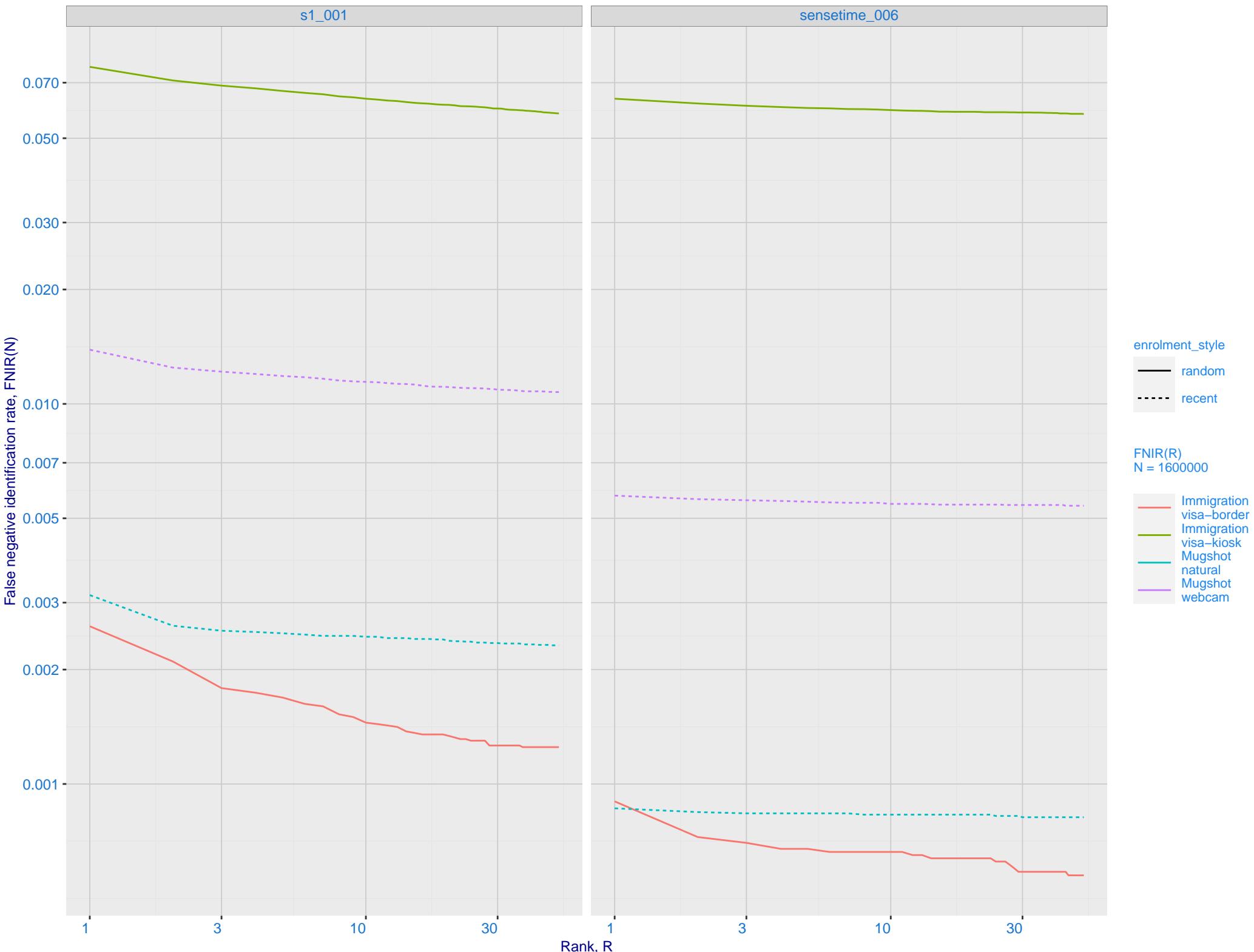
M: Template duration; search duration vs. N. The blue and pink ribbon covers 95 percent of observed measurements. The template generation time is independent of N. The log and power–law models are fit to the first two (N,T) observations
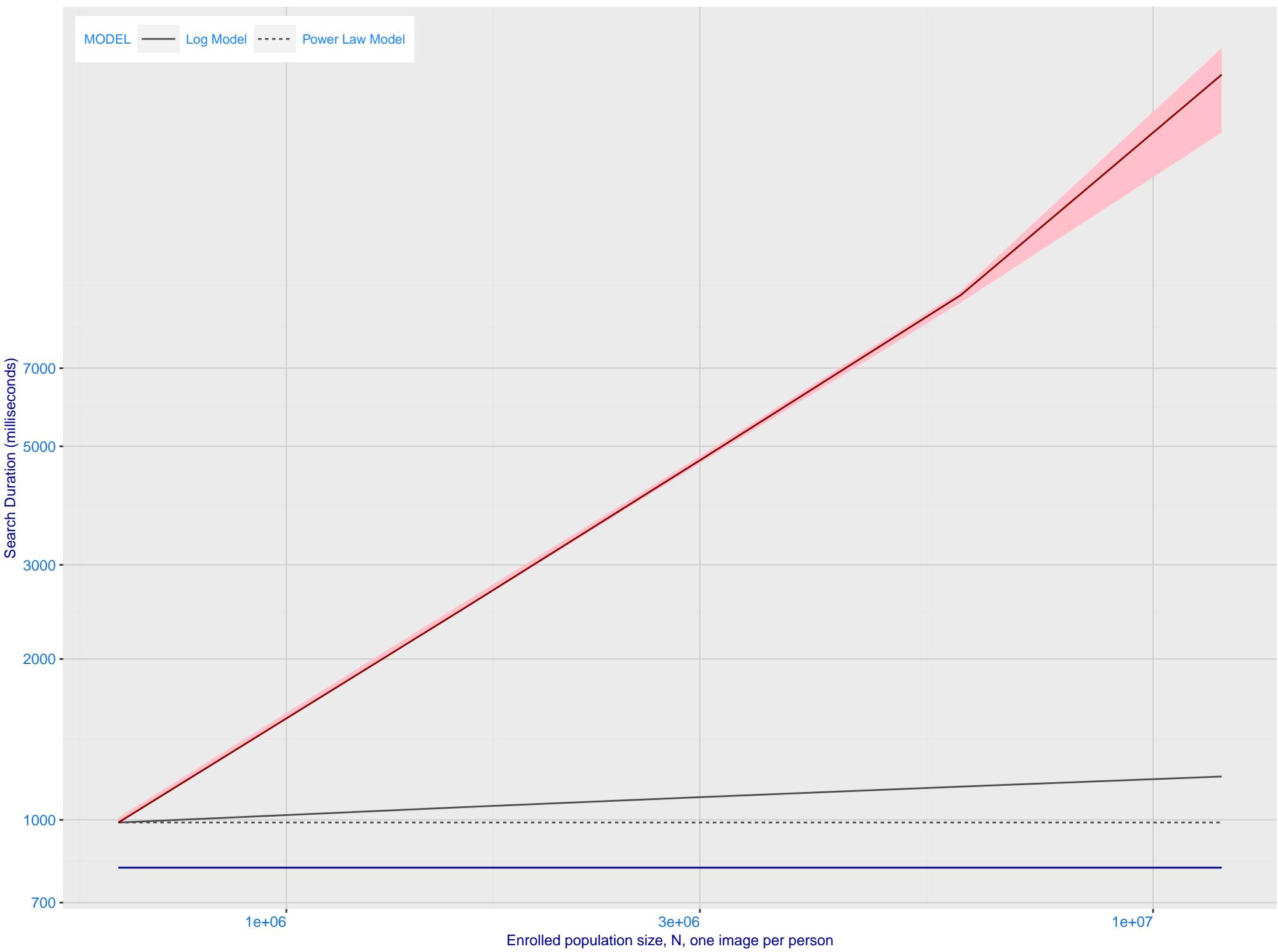
O: FNIR(T, N = 1.6 million) by sex, age and time−lapse. The top row gives investigational rank−1 miss rates. The bottom panels give high threshold for more lights−out identification with low FPIR.

Algorithm: s1_001, Dataset: Border−Crossing Ageing N = 1600000
Text encodes FNIR, Color encodes log(FNIR)

Female

FNIR(R=1, T=0)

Age group	10	11	12	13	14	15
(60:99]	0.014	0.017	0.019	0.019	0.022	0.031
(45:60]	0.014	0.014	0.016	0.019	0.022	0.023
(30:45]	0.017	0.016	0.020	0.023	0.025	0.030
(21:30]	0.024	0.023	0.027	0.029	0.031	0.035
(18:21]	0.042	0.039	0.042	0.045	0.046	0.046
(15:18]	0.056	0.051	0.056	0.057	0.059	0.061
(12:15]	0.071	0.059	0.064	0.076	0.076	0.077

Male

| Age group	10	11	12	13	14	15
(60:99]	0.004	0.004	0.004	0.005	0.009	0.018
(45:60]	0.004	0.004	0.005	0.006	0.008	0.008
(30:45]	0.005	0.004	0.006	0.007	0.009	0.009
(21:30]	0.008	0.007	0.008	0.009	0.012	0.010
(18:21]	0.017	0.017	0.019	0.021	0.022	0.019
(15:18]	0.047	0.042	0.048	0.061	0.063	0.077
(12:15]	0.090	0.085	0.110	0.105	0.115	0.087

FNIR(R=50, T=0.673093), FPIR(30−45, Male) = 0.001

Female:

Age group	10	11	12	13	14	15
(60:99]	0.063	0.066	0.083	0.085	0.095	0.127
(45:60]	0.060	0.061	0.073	0.088	0.097	0.106
(30:45]	0.075	0.079	0.091	0.105	0.115	0.117
(21:30]	0.101	0.101	0.114	0.129	0.134	0.139
(18:21]	0.161	0.159	0.168	0.189	0.191	0.190
(15:18]	0.209	0.202	0.218	0.239	0.242	0.198
(12:15]	0.275	0.254	0.277	0.296	0.304	0.267

Male:

Age group	10	11	12	13	14	15
(60:99]	0.033	0.035	0.037	0.055	0.053	0.078
(45:60]	0.029	0.032	0.040	0.047	0.054	0.056
(30:45]	0.035	0.036	0.044	0.056	0.063	0.061
(21:30]	0.053	0.055	0.065	0.076	0.087	0.081
(18:21]	0.131	0.127	0.143	0.168	0.183	0.195
(15:18]	0.270	0.274	0.296	0.340	0.363	0.387
(12:15]	0.434	0.426	0.478	0.502	0.525	0.442

Age group at time of enrollment

Time between probe and enrollment (years)

P: FPIR(N = 1.6 million) by sex and age. It is typical for false positive identification rates to be higher in women except in their teens.

Algorithm: s1_001, Dataset: Border−Crossing Ageing
Threshold: 0.673093 set to achive FPIR(30−45, Male) = 0.001

Color encodes log(FPIR)

−4   −3   −2   −1

Age group of person in non−mate probe (The age of the highest non−mates will usually be similar to that of the probe.)	Female	Male
(60:99]	0.0111	0.0007
(45:60]	0.0064	0.0006
(30:45]	0.0047	0.0010
(21:30]	0.0074	0.0020
(18:21]	0.0091	0.0024
(15:18]	0.0106	0.0033
(12:15]	0.0099	0.0050

Sex of person in non−mate probe
(The sex of the highest non−mates will usually be that of the probe.)

Q: Identification FNIR(N, T, L+1) and Investigational FNIR(N, 0, R) under ageing